

WHAT IS CLAIMED IS:

1 1. A method of generating a dynamic image mask comprising:
2 scanning an image to produce a digital original image comprised of a plurality
3 of pixels corresponding to a spatial location in the image, wherein each pixel includes
4 an original value corresponding to a characteristic of the image; and
5 calculating a dynamic image mask value for each pixel by averaging the
6 original value of a pixel with only the original values of the pixels proximate that
7 pixel having original values lower than a threshold sharpness.

1 2. The method of Claim 1, wherein scanning an image comprises
2 scanning a film image

1 3. The method of Claim 1, wherein scanning an image comprises
2 scanning a photographic print.

1 4. The method of Claim 1, wherein the original value corresponding to a
2 characteristic of the image comprises an intensity value corresponding to a color.

1 5. The method of Claim 1, wherein the original value corresponding to a
2 characteristic of the image comprises an intensity value corresponding to luminance.

1 6. The method of Claim 1, wherein the original value corresponding to a
2 characteristic of the image comprises an intensity value corresponding to range of
3 frequencies.

1 7. The method of Claim 1, wherein averaging the original value of a pixel
2 with only the original values of the pixels proximate that pixel having original values
3 less than a sharpness threshold comprises averaging the original value of a pixel with

only the weighted original values of the pixels proximate that pixel having original values less than a sharpness threshold.

8. The method of Claim 7, wherein the weighted original values are determined according to the following formula:

$$w_N = \left(1 - \frac{|pixelN - centerpixel|}{Gain} \right),$$

wherein pixelN is the value of the pixel being weighed, centerpixel is the value of a central pixel, and wherein Gain is the threshold sharpness.

9. The method of Claim 1, wherein the original values used to calculate the difference less than the sharpness threshold correspond to different characteristics than the original values used in averaging.

10. The method of Claim 1, wherein calculating a dynamic image mask value includes performing a pyramidal decomposition on the original image.

11. The method of Claim 1, wherein the proximity of the pixels used to calculate the dynamic image mask value can be varied by a user.

12. The method of Claim 1, wherein the sharpness threshold can be varied by a user.

PATENT APPLICATION

1 13. A method of generating an image mask comprising:
2 scanning an image to produce a digital original image;
3 generating a decimated representation of the original image;
4 applying a blurring algorithm to form a blurred representation of the decimated
5 representation, wherein the blurred representation includes a plurality of pixels having
6 varying values to form sharp edges representative of rapidly changing boundaries in
7 the decimated image and less sharp regions corresponding to regions of less rapidly
8 changing values in the decimated image; and
9 combining the blurred representation with the decimated representation.

1 14. The method of Claim 13, wherein the combination of the blurred
2 representation with the decimated representation is used to generate an image mask.

1 15. The method of Claim 13, wherein a plurality of decimated images are
2 generated to form sequential levels in a pyramidal decomposition formation, and a
3 sequential level is formed by decimating the image of the current level.

1 16. The method of Claim 13, wherein image detail is arranged over an area
2 having a particular radius, and the blurring algorithm is capable of blurring detail
3 found in the original image over a radius proportional to the particular radius in which
4 the image detail is arranged.

1 17. The method of Claim 13, wherein the blurring algorithm is performed
2 on decimated representations of a plurality of levels of the pyramidal decomposition
3 formation, prior to forming the image of the next level.

1 18. The method of Claim 13, wherein the value of a pixel in the blurred
2 representation is dependent upon a contrast between a corresponding pixel in the
3 decimated image and pixels proximate to the corresponding pixel.

PATENT APPLICATION

1 19. The method of Claim 13, wherein the value of a pixel in the blurred
2 representation is dependent upon a rate of change in contrast between a corresponding
3 pixel in the decimated image and pixels proximate to the corresponding pixel.

1 20. The method of Claim 13, wherein the blurring algorithm includes
2 averaging the value of a central pixel corresponding to the pixels in the blurred
3 representation with weighted values of a plurality of neighboring pixels.

PATENT APPLICATION

1 21. A method for enhancing a scanned image comprising:
2 scanning an image to produce a digital original image comprised of a plurality
3 of pixels corresponding to a spatial location in the image, wherein each pixel includes
4 an original value corresponding to a characteristic of the image;
5 calculating a dynamic image mask value for each pixel by averaging the
6 original value of a pixel with the original values of the pixels proximate that pixel
7 having original values lower than a threshold sharpness; and
8 applying the dynamic image mask value to the original value for each
9 corresponding pixel using a mathematical function to produce an enhanced scanned
10 image.

1 22. The method of Claim 21, wherein scanning an image comprises
2 scanning a transparency based image.

1 23. The method of Claim 21, wherein scanning an image comprises
2 scanning a reflective based image.

1 24. The method of Claim 21, wherein the original value corresponding to a
2 characteristic of the image comprises an intensity value corresponding to a color.

1 25. The method of Claim 21, wherein the original value corresponding to a
2 characteristic of the image comprises an intensity value corresponding to range of
3 frequencies.

1 26. The method of Claim 21, wherein averaging the original value of a
2 pixel with only the original values of the pixels proximate that pixel having original
3 values less than a sharpness threshold comprises averaging the original value of a
4 pixel with only the weighted original values of the pixels proximate that pixel having
5 original values less than a sharpness threshold.

27. The method of Claim 26, wherein the weighted original values are determined according to the following formula:

$$w_N = \left(1 - \left| \frac{\text{pixel}N - \text{centerpixel}}{\text{Gain}} \right| \right),$$

wherein pixelN is the value of the pixel being weighed, centerpixel is the value of a central pixel, and wherein Gain is the threshold sharpness.

28. The method of Claim 21, wherein the original values used to calculate the difference less than the sharpness threshold correspond to different characteristics than the original values used in averaging.

29. The method of Claim 21, wherein calculating a dynamic image mask value includes performing a pyramidal decomposition on the original image.

30. The method of Claim 21, wherein the mathematical function comprises division.

31. The method of Claim 21, wherein the mathematical function comprises:

$$OUT = \frac{IN}{\frac{3}{4} MASK + \frac{1}{4}},$$

wherein OUT is the value of the pixel being calculated in the enhanced scanned image, IN is the value of the relative pixel in the original image, and MASK is the value of the relative pixel in the dynamic image mask.

PATENT APPLICATION

1 32. The method of Claim 21, further comprising performing histogram
2 leveling to the enhanced scanned image.

1 33. The method of Claim 21, wherein the enhanced scanned image
2 includes an image contrast and a grayscale contrast.

1 34. The method of Claim 33, wherein the image contrast and the grayscale
2 contrast can be controlled independently of each other.

1 35. The method of Claim 21, wherein the dynamic image mask value may
2 be proportionally varied by a user.

PATENT APPLICATION

1 36. A scanner system comprising:
2 a light source operable to illuminate an image disposed within a media;
3 a sensor system operable to measure the illumination from the image and
4 produce electronic signals;
5 a processor operable to receive the electronic signals and produce image
6 values for each pixel; and
7 a memory media having software stored thereon, wherein the software is
8 operable to:

9 calculate a dynamic image mask value for each pixel by averaging the
10 image value of a pixel with the image values of the pixels proximate that pixel
11 having image values lower than a threshold sharpness; and
12 apply the dynamic image mask value to the image value for each
13 corresponding pixel using a mathematical function to produce an enhanced
14 scanned image.

1 37. The scanner system of Claim 36, wherein the sensor system operates to
2 measure the illumination transmitted through the image.

1 38. The scanner system of Claim 36, wherein the sensor system operates to
2 measure the illumination reflected from the image.

1 39. The scanner system of Claim 36, further comprising a printer operable
2 to print the enhanced scanned image.

1 40. The scanner system of Claim 39, wherein the printer comprises a
2 photographic printer.

1 41. The scanner system of Claim 39, wherein the printer comprises an ink
2 type printer.